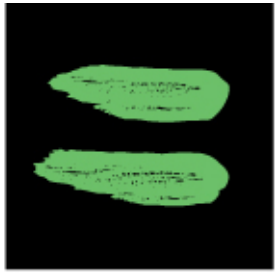


# How to.. write a scientific expertise

Yorck Olaf Schumacher



A D A M S

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JOINT  
REPORT 2

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3 ATHLETE'S  
EXPLANATION

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BPID

Gender

Male

Sport

Cycling; Cycling

Expert

Schumacher, Olaf

Expert Opinion

Normal

Not submitted

Comment

Male cyclist with 4 samples, all obtained in 2018. Normal and stable reticulocyte level, one haemoglobin value (last sample) marginally outside the individual reference range. Given that the sample has been obtained at the end or outside the competitive season, plasma volume contraction is a possible explanation. Therefore, I would consider the profile as normal.

- Athlete – Sport – (Sample distribution)
- **Step 2: Formal Analysis**
  - (Pre)analytics – Quality - Confounders
- **Part 2: Profile Overview**
  - Abnormalities – Normalities – Time factors
- **Part 3: Likelihood Evaluation**
  - Normal – More data – Pathology - Doping
- **Part 4: Target testing recommendations**



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JOINT  
REPORT 2

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3 ATHLETE'S  
EXPLANATION

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L. Arm-Strong  
APMU Manager  
Laboratory for Doping Analysis  
17 rue des Tricheurs  
Les Epoietines HCT 499  
CANADA

Evaluation of Blood Profile XYZ1234 – Joint expert opinion

14.

### Part 1 - Framework

- Request - Timeline
- Regulatory Framework
- Previous reports
- Documents + information evaluated

### Part 2 – Quantitative Analysis

- Adaptive Model
- Describe abnormalities
- (Sequence abnormalities)

### Part 3 – Analytical Assessment

- Quality of samples + Analysis
- Potential invalidations
- Statement on impact of deviations

### Part 4 – Qualitative Analysis

- Describe the abnormal features
- Discuss potential explanations
- Point by point

## Part 4 – Qualitative Analysis

- Describe the abnormal features
- Discuss potential explanations
- Point by point
- Use references (+figures)

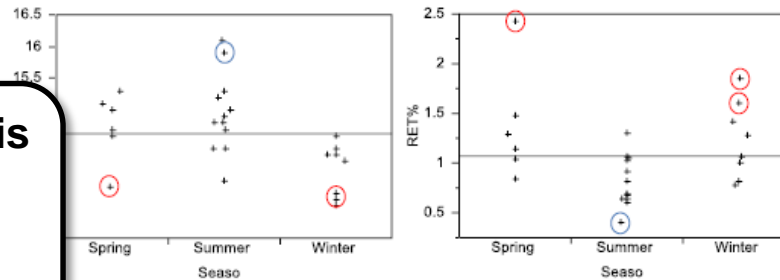


Figure 1: Haemoglobin concentration (g/dL, left panel) and Reticulocytes (%; right panel) of athlete BPG298S15 in relation to the competitive season. It is clearly visible that the values obtained in summer (main competitive season) display higher haemoglobin paired with lower reticulocytes, suggesting a supraphysiologically increased red cell mass during that time when compared to winter. The circles and arrows represent the abnormalities (Abnormality 1 (sample 7) in blue, abnormality 2 (samples 25-27) in red).

2. Samples 25-27 with an obvious reticulocyte increase with low haemoglobin concentration. In the mentioned samples, the athlete displays the lowest haemoglobin paired with the highest reticulocytes of the profile (the samples are circled and highlighted with arrows in figure 1 above).

Such constellation is typically observed after blood loss, where haemoglobin concentration is low and the body increases its erythropoietic activity to counterbalance the loss, thus the increased reticulocytes.

The athlete was apparently 19-20 weeks pregnant when sample 27 was obtained. Pregnancy usually causes a drop in haemoglobin concentration due to plasma volume expansion and (possibly) an increase in reticulocytes to accommodate the blood volume for the unborn child (3–5). The timeline of haematological changes in relation to the state of the pregnancy is well defined in the scientific literature (see figure 2 from (3)) below), and matches the profile of the athlete. Therefore, the constellation visible in the last part of the profile can be explained by a pregnancy.

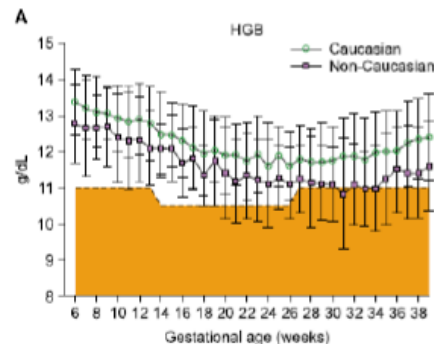


Figure 2: Haemoglobin concentration in pregnant women throughout the gestational period (from (3)).

## Part 5 – Likelihood Assessment

- Evaluate the likelihood for the potential causes

We therefore conclude that it is highly likely that a Prohibited Substance or Prohibited Method has been used and that it is unlikely that the passport is the result of any other cause.

It is our unanimous opinion that considering the information available at this stage and in the absence of an appropriate physiological explanation, the likelihood of the abnormality 1 described above being due to blood manipulation, namely the artificial increase of red cell mass using an erythropoietic stimulant and/or blood transfusion is high. On the contrary, the likelihood of a medical condition causing the supraphysiologically increased red cell mass visible in this sample is low.

Analytical shortcomings are also highly unlikely to have caused the suspicious pattern in the profile. Environmental factors such as altitude exposure are also improbable to have had a significant effect, as based on the available documentation, the athlete never sojourned at altitudes sufficient to trigger haematological changes such as observed in the relevant samples.

The last part of the profile with the abnormal samples 25-27 (abnormality 2) can be explained by the pregnancy of the athlete.

We therefore recommended requesting the athlete's explanations for her blood values regarding the first point highlighted above.

at your disposal for any further questions you might have,

## Part 5 – Likelihood statement

- Evaluate the likelihood for the potential causes

M. Audran

Y.D. Schumacher

### References

1. Broadbent S. Seasonal changes in haematology, lymphocyte transferrin receptors and intracellular iron in Ironman triathletes and untrained men. *Eur J Appl Physiol.* 2011 Jan;111(1):93–100.
2. Kristal-Boneh E, Froom P, Harari G, Shapiro Y, Green MS. Seasonal changes in red blood cell parameters. *Br J Haematol.* 1993 Nov;85(3):603–7.
3. Harm SK, Yazer MH, Waters JH. Changes in hematologic indices in caucasian and non-caucasian pregnant women in the United States. *Korean J Hematol.* 2012 Jun;47(2):136–41.
4. Choi JW, Pai SH. Change in erythropoiesis with gestational age during pregnancy. *Ann Hematol.* 2001 Jan;80(1):26–31.
5. Howells MR, Jones SE, Napier JA, Saunders K, Cavill I. Erythropoiesis in pregnancy. *Br J Haematol.* 1986 Nov;64(3):595–9.



## **Summary Joint Expert Report**

- **Part 1: Profile Framework**
- **Part 2: Quantitative Analysis**
- **Part 3: Analytical Assessment**
- **Part 4: Qualitative Analysis**
- **Part 5: Likelihood Assessment**





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JOINT  
REPORT 2

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3 ATHLETE'S  
EXPLANATION

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Informe Pericial

# Modelo de Marcadores Hematológicos para Deportistas

Estudio Metodológico, Aplicación del Modelo y Evaluación de Resultados

AL - HAYAT HOSPITAL  
Dr. I. Kattan

MIRN... 30a 921... رقم الملف Patient's Name: Mohammed  
Date: 1... 7... 2011... التاريخ Attending Physician: ... Dr. Sa...

Pass No  
R035115

## PRELIMINARY REPORT

تقرير أولي

Complaints, History and Examination:

- E.R Admission For b  
- General Exam: -  
- Medically Fit by general Examination

Diagnosis: \* Blood donation  
450 c.c group B

Specialized Medical Center Hospital  
P.O. Box 68548 Riyadh 11586, Kingdom of Saudi Arabia  
Tel. 4343800 Fax 4160300

PATIENT'S NAME: HASSIN JMAAN ALHMIDA  
MEDICAL REC. #: 556127  
REFERRING: DR. SAUD ABO HARBESH

DATE OF REPORT: 29/5/2013

## MEDICAL REPORT

The patient is a 30-year-old Saudi gentleman from the South of Saudi Arabia Najran area. He had been seen in my hematology/oncology outpatient clinic at Specialized Medical Center Hospital on May 12, 2013 by request of the Sports Medicine in the Kingdom for further investigation of his polycythemia as well as hemosiderosis.

The story of this gentleman is that he is a Marathon runner who has been found by the international committee to have very high serum ferritin and high hemoglobin which was 19 and reading is around 20,000 and he was prohibited from participation in a further service because of claim that this is most likely due to erythropoietin or erythropoietin analogue injection.

By taking quick history from the patient, he said he used to do his training in Ethiopia in a mountainous area which is more than 3000 meter above the sea level and then in Morocco. Then he left that area to London where he participated in the International Olympian.

He said he has no family history of any hematological disorder and he never been told by any previous physician that he got blood disorder until recently but he been quoted by the medical team and found to have high hemoglobin.

He said that currently, he is just doing his usual daily exercise and he is not willing to participate in any previous for the time being and he denies any injection but he states he received oral iron tablet.

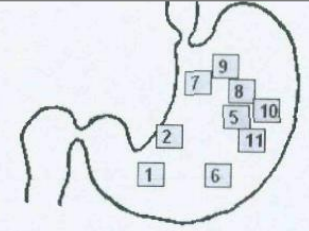
His physical examination showed well-looking gentleman, not in distress. He is an African black descent. He also denies history of pulmonary or cardiac illnesses.

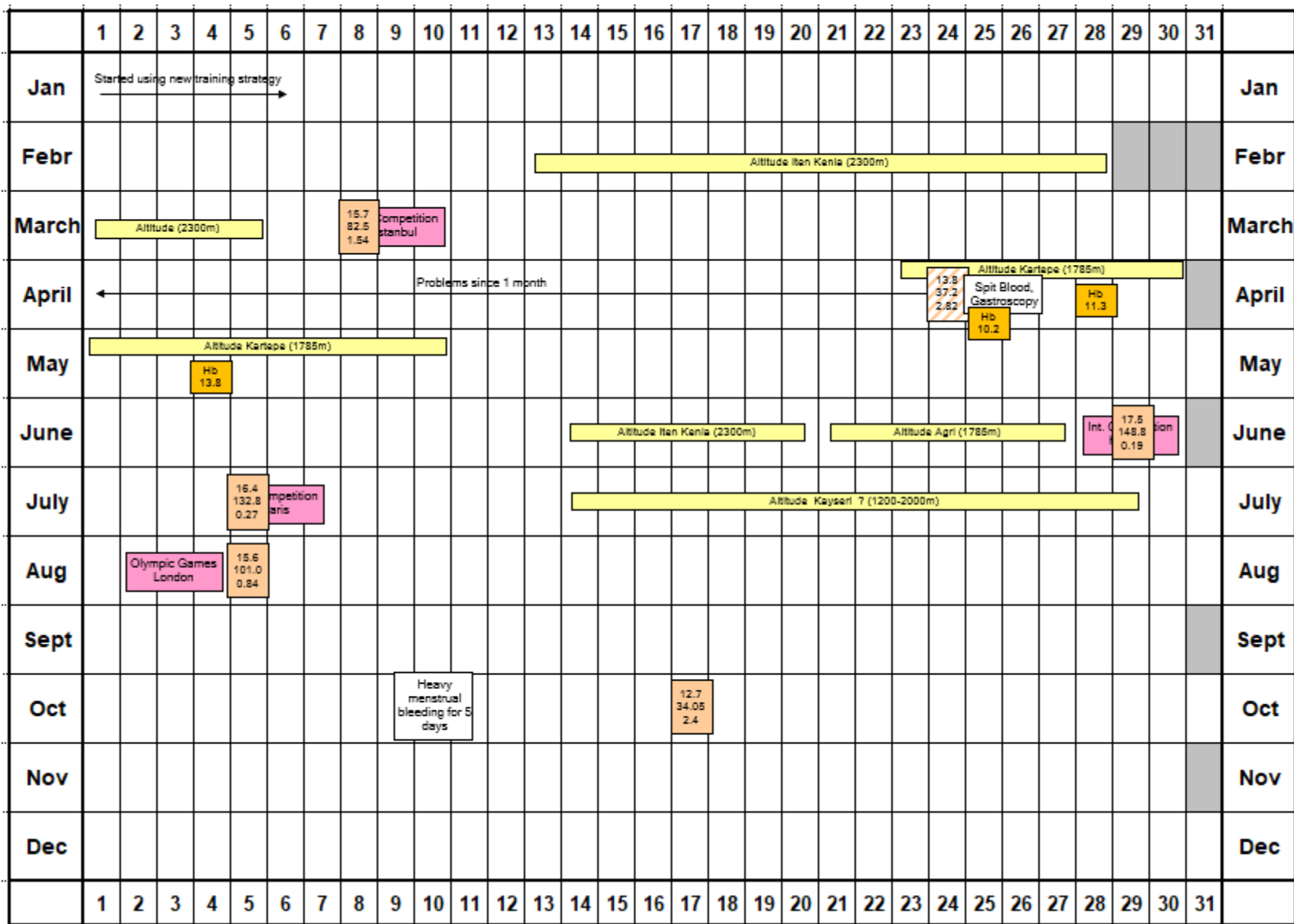
His investigation which we did at our institute showed serum ferritin of 3291 and also done in the Mayo Clinic when the samples were sent for further study of hemochromatosis and found to have serum ferritin of 2549. The other investigation which we did in our institute is erythropoietin level and turned to be low which is 2.2 mIU/ml which is less than the normal range and indication for hemochromatosis HFE gene study for C228Y and H63D both are negative. Hemoglobin dissociation curve plot 50% is 28 mmHg which is also within normal range. Hemoglobin electrophoresis showed hemoglobin A2 of 1.9, hemoglobin A1 is 98.1 and no other variant band. We have not done any genetic molecular study for other type of variant hemoglobin.

In summary given this story, most likely the explanation for his high serum ferritin and according to cardiovascular system...

Строба № 2 в. 2010 г. (Барселона)  
1. Старей сорев биле в сорак (дисловогик) 800-1000 м.  
2. Иа соревнико било оскр марко (поск фимика кумс не потарод. ознашка).  
3. Болезней перед сорев номосеу не биле

Interval	Investigation	ANAMNEZA	STATUS	IZVIDI
22-10-2007	ORL	ORL investigation showed normal results...		
04-02-2008	ORL	Investigation in general...		
21-02-2008	ORL	Investigation in general...		
25-04-2008	ORL	Investigation in general...		
19-08-2008	ORL	Investigation in general...		
19-12-2008	ORL	Investigation in general...		
26-1-2009	ORL	Investigation in general...		
08-02-2009	ORL	Investigation in general...		
18-02-2009	ORL	Investigation in general...		





Started using new training strategy →

Altitude Iken Kenia (2300m)

Altitude (2300m)

15.7  
82.5  
1.54  
Competition Istanbul

Problems since 1 month

Altitude Kartape (1785m)

13.8  
37.2  
2.82

Spit Blood, Gastroscopy

Hb 11.3

Hb 10.2

Altitude Kartape (1785m)

Hb 13.8

Altitude Iken Kenia (2300m)

Altitude Agri (1785m)

Int. C

17.5  
148.8  
0.19

Competition

Olympic Games London

16.4  
132.8  
0.27  
Competition Paris

15.6  
101.0  
0.84

Altitude Kayseri 7 (1200-2000m)

12.7  
34.05  
2.4  
Heavy menstrual bleeding for 8 days

L. Arn-Strong  
APMU Manager  
Laboratory for Doping Analysis  
17 rue des Tricheurs  
Les Epoietines HCT 499  
CANADA

14.2.2018

c.: Evaluation of Blood Profile XYZ1234 – EVALUATION OF ATHLETE'S ARGUMENTS

### Part 1 - Framework

- Request - Timeline
- Previous reports
- Documents + information evaluated

### Part 2 – Previous Analysis

- Summarize abnormalities

### Part 3 – Athlete's arguments

- Summarize athlete's submission

### Part 4 – Argument Analysis

- Discuss potential explanations
- Point by point
- Scientific references!

### Part 5 – Likelihood statement

- Evaluate the likelihood for the potential causes



## Summary Evaluation of Athlete's Arguments

- **Part 1: Profile Framework**
- **Part 2: Summary of previous Reports**
- **Part 3: Summary of athletes explanations**
- **Part 4: Point-by-point Analysis**
- **Part 5: Likelihood assessment**

# DO

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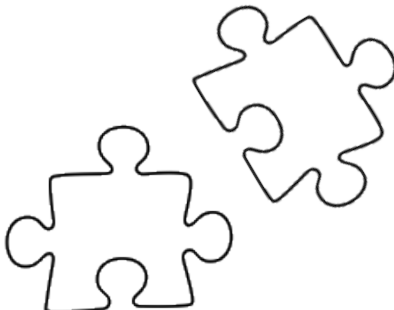
- Direction of evaluation - Logic
- Lay language
- Explain physiological background
- Figures + Illustrations

# DON'T

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- Statement on guilt
- “Maximalistic” terms (“Impossible”, “Can not”..)
- Polemic language
- Nonscientific speculation
- Venture outside of area of expertise







If Law has made you a witness, remain a man of science

P. Broussard, 1887

